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CONTAINER CONSTRUCTIONS IN YUDJA: LOCATIVES, INDIVIDUATION AND MEASURE

ABSTRACT: The possible interpretations of container phrases (such as 'cups of sugar') has been long debated in the formal semantics literature because container phrases can be associated with a variety of possible readings that go from individuation to measure. In this paper we explore the interpretation of container phrases in Yudja (Tupi stock, Brazil), a language where container phrases are optional in construction with numerals and are morphosyntactically identical to locative phrases. Based on experimental studies with Yudja children and adults we intend to show that these expressions are ambiguous in at least three ways (locative, individuation and measure) and that a locative reading might emerge even in scenarios where the verb and the context favor a measure interpretation. Furthermore, this paper provides evidence that there is no hidden container phrase when numerals are combined with notional mass nouns and that, supporting Partee & Borschev (2012), the results of the studies show that, indeed, the individuation reading is more "primitive", i.e. it precedes measuring in language acquisition.

1. INTRODUCTION

Container nouns (such as *cup*, *bottles*) are a crucial piece in the discussion of the distinction between count and mass nouns across languages. In most of the non-classifier languages described in the literature, a measure or container phrase is required in order for a numeral to be directly combined with a notional mass noun such as *honey*:

(1) a. *I bought three honeys
b. I bought three bottles of/containers of/liters of honey

In most languages, these phrases are required in order to define the unit that is being counted in a particular context. Without them, sentences that include mass nouns and numerals are ungrammatical or reinterpreted by coercion.[1] In Yudja (Juruna family, Tupi stock) numerals can be directly combined with notional mass nouns even when coercion is not possible, that is, even when conventionalized containers are not available in the context (2a):

CONTEXT: The Yudja people are organizing a workshop in Tuba Tuba and they requested three bottles of honey in order to prepare juice. Anana brings three bottles of honey.

(2) a. Anana txabïu awïla wï
Anana three honey bring
'Anana brought three (bottles of) honey'

In Yudja container nouns are optional in construction with numerals. When they do occur, they are followed by the postposition *he* 'in' (2b):

(2) b. Anana txabïu awïla karaha he wï
Anana three honey bottle in bring
'Anana brought three bottles of honey'

In (2a) speaker and listener share the knowledge that the portion of honey that is being considered in the scenario is a bottle. When speaker and listener do not share a common knowledge of the portion one is referring to, a container noun will most likely be included in the sentence (2b). The only difference between (2a) and (2b) is the optional inclusion of the container phrase *karaha he* 'in bottles'.

In previous work (Lima 2012, 2014a,b), I have shown that container phrases in Yudja have the same morphosyntax as do locatives. Locatives in Yudja are formed using a location noun and the postposition *he* 'in':

(3) a. Una yukïdï itxa Baha he
1S salt buy Bang in
'I bought salt in Bang (Bang = the name of a small town in Mato Grosso)'
b. Izaku na yakare be iya he
see 1S crocodile DAT river in
'I saw the crocodile that was in the river'
c. Junho he pitxa au anu, kaita pitxa au anu
Junho in fish have ASP many fish have ASP
'In June there is fish, there are many fishes'

(Fargetti01; 137 – examples 79-81)

The examples above illustrate the distribution of the locative postposition *he* 'in' in Yudja. As discussed by Fargetti (2001)[2], this postposition can be used to indicate location in time and in space. The apparent similarity between locative phrases and constructions that include a container noun followed by a postposition (*he* 'in') is also observed at the syntactic level. Both in locative phrases and in container phrases the constituent [noun + postposition] can occur in virtually any position in the sentence. In locative phrases, the constituent [noun + postposition] cannot occur between the object and the verb (5d). In both cases, the noun (location or container) and the postposition cannot be discontinuous, as illustrated in (4f) and (5e):

Container phrases
Possible orders for 'I brought three (portions of) honey in (a/the/some) bottle(s)' (container phrase: *karaha* 'bottle' and *he* 'in):

(4) a. **Karaha he** una txabïu awïla wï
bottle in 1S three honey bring

b. Una **karaha he** txabïu awïla wï
c. Una txabïu **karaha he** awïla wï
d. Una txabïu awïla **karaha he** wï
e. Una txabïu awïla wï **karaha he**
f. *Una txabïu **karaha** awïla **he** wï

Locative phrases
Possible orders for 'I tied the dog in the house' (locative phrase: *aka* 'house' and *he* 'in'):

(5) a. **Aka he** na apï apayũ
house in 1S dog tie

b. Una **aka he** apï maku
c. Una apï maku **aka he**
d. *Una apï **aka he** maku
e. ***Aka** na apï **he** maku

The existence of these optional container phrases in Yudja, which are morphosyntatically identical to locatives, raises a question about their range of interpretations. The goal of this paper is to argue that beyond the locative interpretation, these phrases can be interpreted as referring to measure units as long as the context makes this interpretation salient.

This paper is organized as follows. In Section 2 we will summarize Lima's (2014b) analysis of counting in Yudja, according to which portions of kinds can be counted as atoms. In Section 3 we will review the literature on container phrases and their possible interpretations across languages. In Section 4 we will review three experimental studies in Yudja that suggest that container phrases can indeed be interpreted as locatives as well as referring to counting units. In Section 5 we will discuss the results of new studies that explored the measure interpretation of container phrases in Yudja. To conclude, in Section 6, we will revisit the Yudja data discussed in Section 5 and compare them to the results of the same studies in other languages (English and Kawaiwete) where container phrases have different grammatical properties.

2. COUNTING IN YUDJA: UNITS ARE CONCRETE PORTIONS

As introduced in Section 1, numerals can be directly combined with all nouns in Yudja. Lima (2014b) has shown that we cannot explain those facts as coercion cases, since counting with notional mass nouns

like *apeta* ('blood') is possible even when the counting unit is not conventional, and even when the atoms that are being counted differ in shape and size. In the absence of a container phrase or a classifier to determine the counting unit – as it happens in other languages – one should ask how counting units are defined in Yudja. In Lima's (2014b) analysis, the basic denotation of nouns in Yudja was hypothesized to be kinds (6). Under this analysis, the property of being an atomic part of a kind depends on an operation (AT*) that maps an individual x, a world w and a kind k to the truth value 1 if and only if x is an atomic part of k(w) or is the sum of atomic parts of k(w) (7):

(6) [[apï]] = λw. DOG (w) (for simplicity: [[apï]] = DOG)[3]

KO (Kinds to Objects)

(7) a. KO = λk: k ∈ K. λx. λw. AT*(w)(x)(k)
b. KO([[apï]]) = λx.λw. AT*(w)(x)(DOG)

Lima argues that the atomic members of a kind are defined as maximal self-connected[4] portions (aka 'concrete portions') of the kind described by the root in the world of evaluation. Saying that an entity is a maximal self-connected portion of a kind *k* in a world *w* means that this entity is a self-connected portion of *k* in *w* that is not a proper part of any self-connected portion of *k* in *w*. Thus, the condition of atomicity under this view can be established as follows:

(8) Condition on atomicity: an entity *x* is an atomic portion of a kind *k* in a world *w* only if *x* is a maximal self-connected part of *k*(*w*).

The definition in (8) states that being a maximal self-connected part of a kind in a world of evaluation is a necessary condition of being an atomic portion of that kind in that world. This condition has two important consequences. First of all, for any kind *k* and world *w*, the mereological fusion of two disconnected parts of *k*(*w*) can never be treated as an atom of *k*(*w*). In order to exemplify these notions, consider the following example. When a Yudja speaker is presented with the following picture, one possible description for it is going to be the following:

(9) Duwadjuse y'a a'i
Four water here
'There are four (portions of) water here'

Each puddle in this scenario is taken as a maximal self-connected portion of water, and it is these portions that are counted. That is, no proper part of these portions will be counted as an atom in this scenario. As a consequence, this scenario won't be described as "five (portions) of water", for example. This analysis predicts that parts of a kind could be considered as an atom as long as these parts do not overlap with other parts.[5] Under this analysis, container phrases would not be required in Yudja in order to define the counting units. However, as we saw in the Section 1, they may occur in constructions with numerals, but they are optional. Given this scenario, it is critical to explore the possible interpretations of container phrases in Yudja, which we will do in Section 4. First, in Section 3, we will give an overview the literature on the interpretation of container phrases across languages.

3. CONTAINER PHRASES IN THE LITERATURE

Container nouns (such as 'cup', 'bucket' or 'bag') are nouns that denote concrete objects that can be used as receptacles for substances. It has been argued that in constructions with numerals (as in 'two glasses of water'), they can be interpreted in at least two different ways (Selkirk 1977; Doetjes 1997; Landman 2004; Keizer 2007; Rothstein 2009, 2011, 2012; Partee & Borschev 2012; Khrizman et al. 2015). Firstly, a container noun can be used to denote actual containers filled with some substance; e.g. 'glasses of water' can denote actual glasses filled with some quantity of water. In this case, the numeral is used to count the number of these receptacles. Following Rothstein (2012), let us call this the individuation interpretation of container nouns. Secondly, a container noun can be used as the description of a unit of measure. In this case, the numeral specifies a quantity on a scale whose units are described by the container noun. When interpreted as a measure unit, the

container noun does not denote the concrete objects that it describes under its receptacle reading; e.g. 'glasses of water' need not refer to actual glasses filled with water, but only to portions of water whose volume corresponds to the content of one glass. Let us call this the measure interpretation of container nouns, again following Rothstein (2011).[6] These two interpretations are illustrated in the following examples:

(10) a. Mary, bring two glasses of water for our guests!
(individuation interpretation most salient)
b. Add two glasses of water to the soup!
(measure interpretation most salient)

(Rothstein 2011; 4 – examples 5a and 5b)

Whereas (10a) is used to refer to actual glasses filled with water, (10b) is used to refer to an amount of water equivalent to the contents of two glasses, and it is asserted that this amount of water must be added to the soup. Rothstein (2011, 2012) has shown that the individuation interpretation and the measure interpretation are associated with different grammatical properties in English. Firstly, when they describe units of measure, container nouns can be suffixed with the morpheme *–ful* (11a/11b). Secondly, the distributive quantifier each can be combined with container nouns when they describe actual receptacles (i.e. in the individuation reading), but not when they describe measure units (12a–12c):

(11) a. Bring two glasses(#ful) of wine for our guests!
(individuation reading)
b. Add two glasses(ful) of wine to the soup!
(measure reading)

(12) a. Two packs of flour cost 2 euros each.
(individuation reading)
b. #Two kilos of flour cost 2 euros each.
(individuation reading)
c. The two glasses of wine (#in this soup) cost 2 Euros each.
(measure reading)

(Rothstein 2011; 4 – examples (6a) and (6b) and Rothstein 2012; 531 – examples (16) and (17))

Rothstein (2012) analyzes the individuation interpretation as a process of counting atomic individuals, whereas she analyzes the measure interpretation as a process of measuring portions of stuff. The counting process is described as "putting atomic entities in one-to-one correlation with the natural numbers" (Rothstein 2012; 5). The measure process is described as "giving a value to a quantity on a calibrated dimensional scale, as in *ten kilos of flour/books*". An important semantic difference between these two processes is that counting presupposes individuation, i.e. the identification of a set of atomic entities that can be enumerated, while measuring doesn't (Rothstein 2012; 5).

Partee & Borschev (2012) also explored the distinction between the individuation and measuring interpretations of container phrases. The authors described four possible readings associated with container nouns in Russian: container + contents, concrete portion, *ad hoc* measure and standard measure. Partee & Borschev (2012) claim that these interpretations are derived by a series of lexical shifts going from the most concrete use of the container noun to the most abstract. The first reading on the derivational scale is the container + contents reading.

According to the authors, the container + contents reading (the individuation reading in Rothstein's terms) is characterized by three grammatical features: 1) the container phrase is incompatible with fractional numbers; 2) the container phrase can refer to containers of different sizes; 3) the container phrase combines with verbs that apply to concrete objects. For example:

(13) Postav' ètov jascik jablok v ugol
Put-IMP this box-ACC.SG apple-GEN.PL in corner
'Put this box of apples in the corner'

Partee & Borschev (2012) argue that the container phrase *jascik jablok* 'box of apples' has the *container + contents* interpretation. According to Partee & Borschev (2012) that is the case because of the verb *postavit'* 'put', which is 'restricted to things that are considered to stand where they are put; that holds of bottles and boxes but not of apples' (Partee & Borschev 2012; 14). If we intended to refer only to the apples we would use instead *postavit' v*, which is a verb followed by a preposition that is interpreted as 'to set (something that stands) into' (Partee & Borschev 2012 ; 14). Under this interpretation, the container phrase

is incompatible with fractional numbers such as *half*, because there is no physical object such as a half-box filled with apples. For that reason, the container + contents reading is a reading that primarily refers to the container. When we say *jascik jablok* 'box of apples' in a sentence with the verb *postav'* 'put' the sentence is not ambiguous as it would be in English but instead we are primarily talking about the box, not the apples.

The second reading on the derivational scale is the concrete portion interpretation. The concrete portion 'characterizes the substance in terms of its occupying (those) containers' (Partee and Borschev 2012; 28). The concrete portion reading as described by Partee and Borschev shares some grammatical properties with the container + contents reading, such as: 1) it requires the substance to be in a particular container (or containers); 2) it can refer to containers of different sizes filled with the same substance and 3) fractional numerals are not compatible with this reading, as illustrated below:

(14) On svaril dve kastrjuli supa, bol'šuju dlja nas i
He cooked two pots-ACC soup-GEN big-ACC for us and
malen'kuju dlja koški.
small-ACC for cat
'He cooked two pots of soup, a big one for us and a small one for the cat.'

(Partee & Borschev 2012; 28 – example 37)

The difference between the container + contents reading and the concrete portion reading lies in the fact that in the concrete portion interpretation the reference is the substance only, whereas in the container + contents reading the reference is the container (and its contents) (Partee & Borschev 2012; 32). In the example in (14), the concrete portion refers then to a substance (soup) that is in two particular containers (pots, for example). Thus, we are counting the number of containers filled with a substance *x* and not the amounts of a substance *x* in those containers.[7]

When the container noun is used to refer to the amounts of a substance in x it is being interpreted as a measure unit. That is, a container noun is used as a measure unit when we count the number of times that a container (such as pot) would be filled by a particular substance. The

measure interpretation is manifested by either the ad hoc measure or standard measure in Partee & Borschev (2012)'s typology. Differently from the container + contents and the concrete portion readings, both measure readings are characterized by the fact that the actual container being used for measure need not be present physically in a particular scenario:

(15) (Is there more soup?)
Da, v kastrjule esce tri tarelki supa ostalos'
yes, in pot still three bowls soup remained
'Yes, there are still three bowls of soup left in the pot.'

In this example (15), the bowls need not to be in the pot. Instead, we are referring to a particular quantity of soup that is equivalent to bowls of soup (if we assume that the amount of soup that corresponds to a bowl is conventionalized among speakers in a particular scenario). *A priori*, any container noun can be conventionalized as a measure unit in a particular scenario. This interpretation is named in Partee & Borschev (2012) the *ad hoc* measure reading.

Another type of measure interpretation of container nouns described by Partee & Borschev (2012) is the standard measure reading, which refers to containers that are lexicalized as measure units in a particular language (e.g. 'cup' in English). The *ad hoc* measure reading differs from the standard measure reading insofar as in the latter but not in the former the container noun is lexicalized as a measure unit and has the semantic status of other non-container measure words such as *liter*. When a container noun is lexicalized as a standard measure unit, there is no requirement that the particular container in question will be involved or appealed to. For example, in English 'cup' is a standardized measure unit ('two cups make a pint, two pints make a quart' (Partee & Borschev 2012; 25) that can be used even when the cup-object is not salient in the context. Two grammatical properties characterize both the *ad hoc* and standard measure readings. First, when a container noun is used as a measure unit, there is an expectation that the container will be full (Susan Rothstein, *apud* Partee & Borschev 2012; 16 – footnote 6). For example, if we are cooking and I say 'add two cups of water to the soup' we are expecting that two full cups of water will be added to the soup. Secondly, container nouns used as measure units

are compatible with fractional numbers. In the same cooking scenario, I could say 'Add two and a half cups of water to the soup'.

The following table summarizes the features that characterize individuation and measure:

	Individuation	Measure
Does it allow fractional numbers?	No	Yes
Does it require the container to be full?	No	Yes
Can it refer to containers of different sizes filled with the same substance?	Yes	No

Table 1: Grammatical properties of interpretations of container nouns (Partee & Borschev 2012)

Previous experimental studies done in Yudja have explored the properties summarized in Table (1). These studies have shown that container nouns in Yudja differ from their English and Russian counterparts insofar as they are not only syntactically but also semantically indistinguishable from constructions with locative phrases. In the next section we review three studies that explore the locative and individuation interpretation of container phrases in Yudja.

4. STUDIES WITH CONTAINER NOUNS IN YUDJA: LOCATIVE AND INDIVIDUATION INTERPRETATIONS

Lima (2014a,b) presented three studies of the interpretation of container phrases in Yudja. All three studies were done with 20 Yudja adults and 26 Yudja children (8, 4-to-6-year-olds; 18, 7-to-12-year-olds).

In the first study, a picture-sentence matching (i.e. participants had to decide whether a sentence was a possible description for a given picture), containers' size and the amount of a substance in the containers were both manipulated. Recall that container phrases in Yudja have the same syntax as locative phrases. If interpreted as locatives, container phrases would convey that some concrete portion of *x* is located in a container *y*. Other parameters of interpretation such as the size of the container and the amount of the substance (i.e., whether the containers are completely full or half-full, etc.) would not be critical as they would be for the measure interpretation (cf. Table 1, Section 3). Thus, the goal of this task was to check whether container phrases could be used to describe pictures that did not correspond to exact amounts of a substance *x*.

In this first study, participants were shown 16 photos in random order: five photos represented containers of different sizes, filled with the exact same substance (c); five photos represented containers of the same size, but with different amounts of a given substance (a); and six photos represented containers of the same size that included small portions of a given substance (b) as illustrated below:

(16)

a. different quantities

Yauda uã karaha he
two oil bottle in

b. small quantities

Yauda puju xãã he
two beans bowl in

c. different size containers

Yauda awatxi'i xãã he
two rice bowl in

All children and all but one of the adults agreed that all photos could be described by the target phrase, which included a numeral and a container noun followed by the postposition *he* 'in'. This shows that, in principle, Yudja children and adults can interpret these phrases as locatives. Only one speaker (a 20-year-old adult, female) disagreed with this judgment. Her comments were: "because one is a half" (for similar containers with different quantities); "because the quantity is small" (for similar containers with small quantities of a given substance); and "because the quantities are different" (for containers of different sizes). This participant explained that she expected that the containers would be full, which suggests a potential measure interpretation of those items.

The results of this study are compatible with both the container + contents and concrete portion readings described by Partee & Borschev (2012), given that two of the properties we manipulated are characteristic of these interpretations (containers can be of different sizes filled

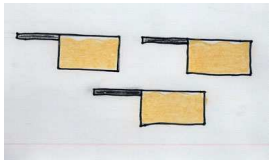
with the exact same amount, and containers can be identical, but filled with different amounts of a substance). The crucial difference between a locative and a contents + contents/concrete portion interpretation of container phrases is that the locative interpretation does not contribute to determining the individuation/counting unit at any level. That is, in the locative interpretation, the container noun would indicate that a portion of a substance is placed in a receptacle, but it would not determine the counting unit. In the second study, also a picture/sentence matching, the goal was to investigate in more detail this piece of the puzzle: whether container phrases in Yudja could be interpreted as plain locatives and not determine the counting units.

In this second task, two conditions were manipulated as illustrated in (17a/18a) in contrast with (17b/18b):

(17) *Awïla* 'honey'
txabïu awïla wã'ẽ he
three honey pan in

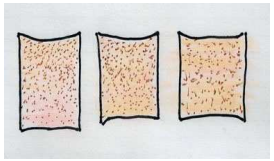
(18) *Asa* 'flour'
Txabïu asa duyãhã he
three flour package in

Condition 1
(17a)



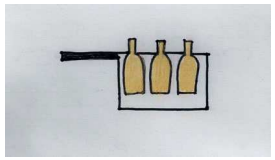
Counting unit: pans
Location of concrete portions: pans.

(18a)



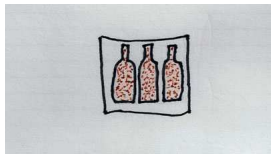
Counting unit: bags.
Location of concrete portions: bags.

Condition 2
(17b)



Counting unit: bottles.
Location of concrete portions: pan.

(18b)



Counting unit: bottles
Location of concrete portions: bag.

The first condition (exemplified in 17a/18a) consisted of one type

of container that was represented in the picture and also expressed in the sentence. For example, in (18a) the sentence was 'There are three (portions of) flour in packages' and that was exactly what the drawing represented. This scenario is compatible with all four interpretations described in Partee & Borschev (2012). The drawing in (17a) could easily be described by an English speaker as 'There are three pans of honey' (or as 'There are three portions of honey in pans', which is closer to a translation of the Yudja container phrases).

The critical items were the items of the second condition (exemplified in 17b and 18b). In these items, two containers were manipulated in the drawings: one indicated the concrete portions of x and the other indicated the location of the concrete portions. In the target sentence only the location of the concrete portions was mentioned. For example, in (17b) the concrete portions (the atoms being considered for counting in this scenario) are bottles. The location is a pan (*txabïu awïla wã'ẽ* he 'there are three (concrete portions) in pans'). The results have shown that Yudja speakers judge these sentences felicitous in both scenarios. These results are crucial to support the hypothesis that the container phrases are not responsible for the mapping of kinds to concrete portions of x (atoms); container nouns followed by postpositions in Yudja may be interpreted as locatives and do not determine the individuation/counting units. Consequently, these facts rule out the hypothesis that in constructions where numerals are directly combined with mass nouns there is a hidden container phrase that could be optionally overt. If that were the case, scenarios such as (18b) would never be accepted by the Yudja speakers. Thus, what determines the unit for counting, as proposed in Section 2, is not the container phrases that are optionally included in these constructions, but the concrete portions that exist in the actual world.

In a third study, a video/sentence matching, we tested the locative interpretation of container phrases in a different type of task. In this study, Yudja speakers had to provide the best description of a scenario presented in a short video. That is, the participants heard a description provided by the experimenter but they were encouraged to provide a better, more precise description if they believed that the description provided by the experimenter (a non-native speaker of the language) was not one that a native speaker of the language would provide. In

this task, the participants watched a video where a man emptied two or three identical containers (in (19), packages of rice) into a different type of container (in (19), a pan). The videos were divided into two lists, A and B, that presented the same actions; the only difference was whether the packages were visible at the end of the action or not (we were testing whether the fact that the counting units were displayed would affect the participants' answers). The containers (in (19), packages of rice) were always identical and were filled with the exact same amount of a substance *x*.[8] Note that at the beginning of the video, the participants saw these containers on the table (before they were transferred to the recipient container) and they could see that they were identical. Their task was to judge whether a sentence as in (19c) could describe the result of the event and, if not, how they would describe it. The target sentence provided by the experimenter in this study only included the location of the concrete portions (*papera akalikali* 'paper box') not the containers that corresponded to the measure units (*seradu* 'bag'):

(19) a. List A: A man emptied two identical packs of rice into a paper box (and in the end of the video, the empty packs are on the table, next to the paper box filled with rice)

b. List B: A man emptied two identical packs of rice into a paper box (and in the end of the video, the empty packs are not visible, we only see the paper box filled with rice)

c. Container phrase: Yauda awatxi'i papera akalikali he
two rice box in
'There are two (bags of) rice in the paper box'

None of the children provided a different description for the scenario they saw. They agreed that the target sentence provided by the experimenter could describe the videos presented (*Yauda awatxi'i papera akalikali he* - lit.: there are two (portions of) rice in the paper box – 19c). That is, children did not modify the target sentence, supporting the hypothesis that container phrases may just be interpreted as locatives.

In the adults' group (20 adults), eight speakers produced a sentence where two container phrases were verbalized: one that referred to the individuation unit and another that referred to their location. The speakers mentioned that the container phrase that refers to the location of the substance (in this example *wã'ẽ* 'pan') is optional in these sentences:

(20) a. Yauda awatxi'i seradu he yahã itutu (wã'ẽ he)
two rice package in NOM drop (pan in)
'Two (portions of) rice in packages were dropped in the pan'

For the other 11 Yudja speakers, the sentence provided in (19c) could be used to describe the event. Five of these Yudja adult speakers

added the verb *etu* 'drop' to the original target sentence and did not make any other modification to the sentence. Thus, for these speakers, the container noun that is used as the individuation unit does not have to be included in the sentence, and the container phrase included in the sentence may be interpreted as a locative (paper box):

(20) b. Yauda awatxi'i papera akalikali he etu
two rice paper box in fell
'Two (portions of) rice fell in the paper box'

In sum, the results of Study 3 have shown that container nouns followed by the postposition *he* 'in' can be used to refer to the individuation units (as illustrated in 20a) where *seradu he* 'in packages', the individuation unit, was included in the sentence by some participants), but it does not need to be, as shown in Study 2 and by the fact that for half of the participants in Study 3 the container phrase expressed in the sentence can be interpreted as a locative (20b), not as the individuation units.

In the next section we will explore the measure interpretation of container phrases in Yudja. We will discuss whether a lexical or contextual bias can trigger this interpretation.

5. CONTAINER PHRASES IN YUDJA: ON THE MEASURE INTERPRETATION

In previous sections we discussed Partee and Borschev's (2012) characterization of measure and non-measure interpretations. The criteria discussed by the authors were the size of the containers and the amount of the substances (i.e., whether the containers are completely full or half-full, etc). Another phenomenon discussed by Partee & Borschev (2012) is verb bias, i.e. the fact that certain verbs are more likely to favor a non-measure interpretation while others are more likely to favor a measure interpretation. For example, in a sentence such as *I broke two bottles of water* the actual quantities of water might be irrelevant as the main event is the breaking of two bottles (non-measure). A verb such as *add* (in cooking contexts) is hypothetically different from *break* in the sense that when someone utters the sentence *I added two bowls of water to the soup* there is an expectation that we are measuring the quantities of water by using a bowl.

In a felicity judgment task we explored both context and verb biases in order to see whether the parameters discussed by Partee & Borschev (2012) can impact Yudja speakers' interpretations of sentences that include a container phrase. The task is described below.

5.1. Materials and methods

In this task the participants had to evaluate whether a given sentence was a felicitous description of an event presented in a video. We manipulated four lists in a between subjects design. Each list was based on a single verb: two lists included verbs/contexts that were intended to favor measure (*awi* 'drink' and *itu* 'pour') and two lists included the verb *dju wï* 'bring' intending to favor the individuation interpretation ('bring two bowls of rice' in one list and 'bring two bottles of water' in another list).

Each list of verbs (*pour, drink, bring water, bring rice*) consisted of four critical conditions (represented in videos) where the amount of a particular substance and the size of the containers were manipulated, as illustrated in the pictures below:

Condition 1: full and identical containers (compatible with individuation and measure interpretations):

Condition 2: full containers of different sizes (incompatible with the ad hoc measure interpretation, if containers need to be of the same size in order to indicate a particular quantity of a substance):

Condition 3: containers of the same size, but with different amounts (incompatible with the *ad hoc* measure interpretation, if containers need to have the same size/amount of a particular substance):

Condition 4: containers of the same size, but not full (incompatible with the ad hoc measure interpretation if containers need to be full):

Partee and Borschev (2012)'s analysis predicts that: 1) only condition 1 would be fully compatible with the *ad hoc* measure interpretation; 2) the individuation interpretation is compatible with all conditions. If measure readings are available, we expect the answers of the participants to vary with the verb list. Here is a summary of the

expected answers:

Verb list	**Condition 1**	**Condition 2**	**Condition 3**	**Condition 4**
Drink (intended bias: measure)	Yes	No	No	No
Pour (intended bias: measure)	Yes	No	No	No
Bring water (intended bias: individuation)	Yes	Yes	Yes	Yes
Bring rice (intended bias: individuation)	Yes	Yes	Yes	Yes

Table 2: Summary of the predicted answers

Beyond the four critical conditions, the participants also had to answer a control question that was characterized by a container number mismatch. For example, in the *pour* list, the critical question was "Maria poured three cups of beans into the bowl. Is that right?"; in the control item, the video would show Maria pouring only two cups of beans. Participants who answered incorrectly the control question were not included in the final analysis of the results.

It is important to emphasize that in the *drink* and *pour* tasks participants heard a context in Yudja prior to watching the series of five videos (one control video/question and four critical videos/questions). The context was verbally introduced while participants saw the picture of the two women involved in the event. The *drink* and *pour* contexts are presented below:

"Drink" context
This is Maria [long hair] and this is Paula [short hair]. Paula needs to drink two cups of water every day. Maria will help Paula to make sure that she drinks two cups of water. We will see a video and I will ask a question about it in the end. Did Paula drink two cups of water?

"Amï ila Maria. Tadei Amï ila Paula. Iyahã na kudamau Paula du yauda kaneku he iya awiwia. Maria kaneku he yauda iya ã'ã Paula awiyãhã. Maxi si ãhã zaka a hae, txidibi una ide ẽda a tehae".

Critical question: Awi de Paula yauda kaneku he iya be
Drink Q Paula two cup in water DAT
'Did Paula drink two cups of water?'

Figure 1: Screen shot of condition 1, 'Did Paula drink two cups of water?'

"Pour" context
This is Paula [short hair] and this is Maria [long hair]. Maria is preparing food. She needs to pour three cups of beans into the bowl. Paula will help Maria in order to make sure Maria got it right.

Critical question: Did Mary pour three cups of beans into the bowl?

Ami ila Paula. Tadei ami ila Maria. Maria puyu wïyã 'ahae. Sudadei txabïu puyu kaneku he yahã itutu a xãã he hae. Paula Maria ba'anu, puyu ã'ã a txabïu kaneku he adju. Maxi si ã'hã zaka a hae, txidibi una ide ẽda a te hae.

Critical question: Itutu de Maria puyu txabïu kaneku he yahã be
Pour Q Maria beans three cup in NOM DAT
xãã he
bowl in
'Did Mary pour three cups of beans into the bowl?'

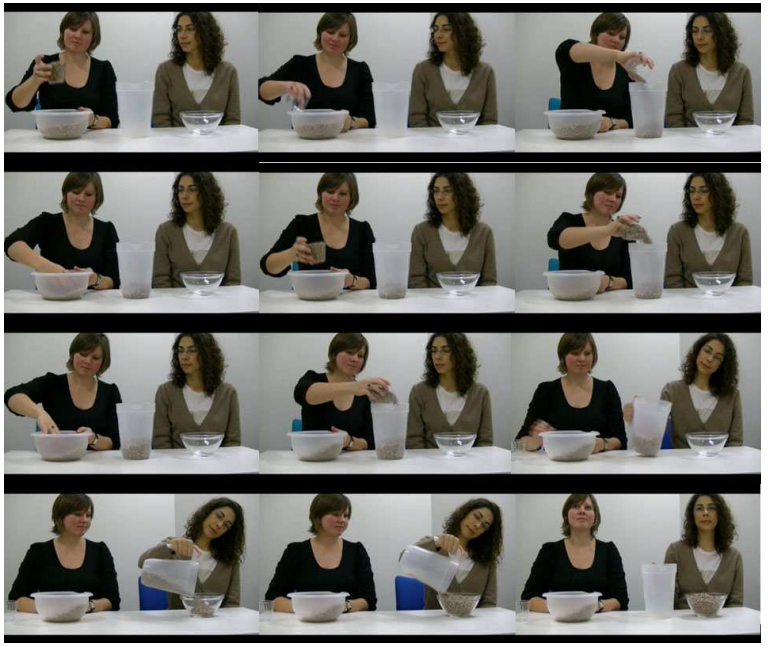


Figure 2: Screen shot of condition 1, 'Did Mary pour three cups of beans into the bowl?'

The *drink* and *pour* lists are characterized by the use of a container phrase such as *y'a kaneku he* ('water in cups' – *awi* 'drink') and *puju*

kaneku he ('beans in cups' – *itu* 'pour') that describes the measure unit that is being manipulated. In the pour context, the final destination of the portions was included in the target sentence (pour three cups of beans into the bowl).

Two lists were based on the verb *dju wï* 'bring': one included a granulated substance ('Maria brought two bowls of rice') and another included a liquid substance ('Maria brought two bottles of water'). The questions that included the verb *dju wï* 'bring' did not have an introductory context; the expectation was that a verb such as *bring* would not favor a measure interpretation. Participants were only told that a woman named Maria would do something and that they had to decide whether the description provided at the end of the videos was consistent with what they saw or not. The critical questions for those lists are presented below:
Critical question:

(21) a. Wï de iidja yauda xãã he awatxi'i
Bring Q woman two bowl in rice
'Did the woman bring two bowls of rice?'

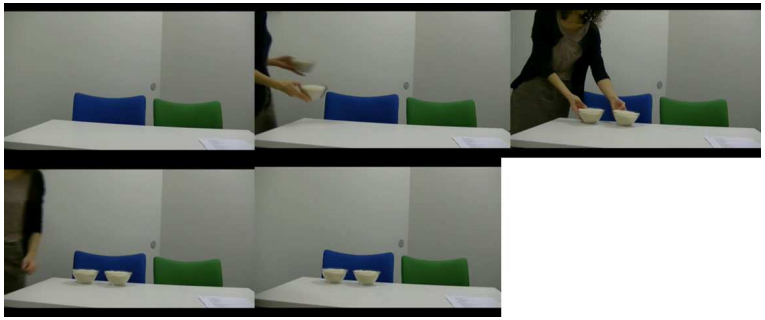


Figure 3: Screen shot of condition 1, 'Maria brought two bowls of rice'

Critical question:

(21) b. Wï de iidja yauda arapadïka he iya dju
Bring Q woman two bottle in water with
'Did the woman bring two bottles with water?'

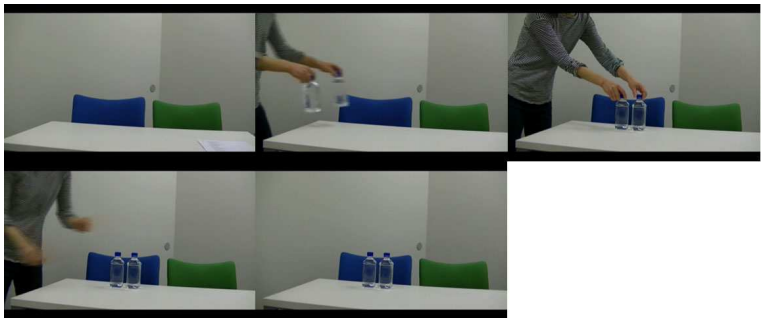


Figure 4: Screen shot of condition 1, "Did the woman bring two bottles with water?'

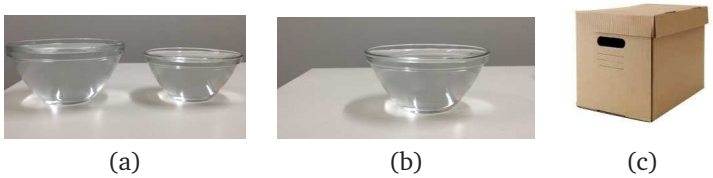
It is important to note that a norming study was carried out in order to check whether container phrases could be used to describe pictures that correspond to conditions 1 to 4. A covered box task was performed. Covered box tasks were introduced in the literature by Huang et al. (2013). In this paradigm, participants are given three options in order to answer a question. One option usually includes the interpretation of the sentence that the experimenter wants to test; a second option usually included a distractor; a third and critical option for the participants is a covered box. Participants are told that if the answer for the question is not visible they can point to the box and say what is in it. This method is a way to prevent the participants from choosing 'the least bad' option. That is, a referent that is not really an accurate answer for a particular question, but that is the more plausible answer in comparison with other options. In our pre-test covered box task in Yudja, participants saw three boxes: 1) a covered box; 2) a picture of one of the conditions; and 3) a picture that corresponded to the distractor (number or substance mismatch). Participants had to answer questions like "where is there three cups of beans?". Participants were told that they could point to the covered box if they evaluated that the thing that was being asked for (in this example three cups of beans) was not visible. If participants ever pointed to the covered box, they had to explain what they expected to be in the box.

(a) (b) (c)

(a) = condition 1; (b) = covered box; (c) = distractor (substance mismatch).

Example of covered box task:

(22) A'i de yauda awatxi'i saku he
Where Q two rice bag in
'Where are the two bags of rice?'



(a) (b) (c)

(a) = condition 2; (b) distractor (number mismatch); (c) = covered box.

Example of covered box task:

(23) A'i de yauda y'a xãã he
Where Q two water bowl in
'Where are the two bowls of water?'

(a) (b) (c)

(a) = covered box; (b) distractor (container mismatch); (c) condition 3.

Example of covered box task:

(24) A'i de txabiu puju kaneku he
where Q three beans cup in
'Where are the three cups of beans?

(a) (b) (c)

(a) = covered box; (b) distractor (substance mismatch); (c) condition 4.

Example of covered box task:

(25) A'i de txabiu puju kaneku he
where Q three beans cup in
'Where are the three cups of beans?'

Participants (20 adults and 26 children[9]) participated in training and in a pre-test task[10] to make sure they understood the task correctly. In the test items, if container phrases could not describe the pictures in conditions 2 to 4, we expected that participants would always point to the covered box in these conditions. Instead, we observed that participants pointed to the covered box only in two trials (see Table 2). As such, these results are aligned with the pattern observed in previous studies (cf. Section 3). A summary of the results per condition is presented below:

	Children		Adults	
	Box	Distractor	Box	Distractor
Condition 1 (children: 15 trials; adults: 12 trials)	-	-	-	-
Condition 2 (children: 15 trials; adults: 16 trials)	-	1	-	2
Condition 3 (children: 16 trials; adults: 16 trials)	1	2	-	2
Condition 4 (children: 18 trials; adults: 16 trials)	1	-	-	-

Table 3: Results for covered box task

Given that the pictures that correspond to conditions 1 to 4 can be described by container phrases in Yudja, we may now explore the results of the felicity judgment tasks where verb and context bias were manipulated based on conditions 1 to 4. Below we discuss these results.

5.2. Results

5.2.1. Adults

Drink
Nine adults answered the list that included questions with the verb *awi* 'drink'. One of them answered the control question incorrectly and as such this participant was not included in the analysis of the data. Out of the other eight participants, four of them accepted the description *Paula y'a kaneku he awi* 'Paula drink two cups of water' in all conditions. The other four participants provided alternative descriptions: two presented descriptions that emphasized that the amount of water in the cups in conditions 2 to 4 did not correspond to two cups. As such, it is possible that these two participants are evaluating the sentence based on Partee and Borschev's measure parameters. An example of the alternative description provided is presented below:

Condition 2:
(26) Awi te kaneku nana anauhï nana idurĩ
drink 3S cup DEM short DEM long
'(She) drank this short cup and this long cup'

Condition 3:
(27) Kaneku pape awa yãha nanĩu tadi nana upadjiha hinaku
cup ? drink nom full then DEM half full only
'She drank a full cup and then a half full cup'

Condition 4:
(28) Awi te nana upadjiha hinaku nana dakĩ upadjiha hinaku
drink 3S DEM half only DEM ? half only
'(Someone) drank only half of this cup and only half of this other cup'

The other two adults that provided alternative descriptions did not make reference to the measure units but to the container used to drink water (in this case, a bowl). These adults pointed to the bowl used for drinking and said that the woman drank a single bowl. These adults favored a locative interpretation of container phrases. An example of the alternative description provided is presented below:

Participant 1 (locative interpretation)
Condition 1:
(29) Meme
'One'

Condition 2:
(30) Meme hinaku nanïũ ixu
one only full eat
'(She) ate only (a) full (bowl)'

Condition 3:
(31) Upadiha hinaku yahã ixu.
half only NOM eat.
'(She) ate only one half (of the bowl)'

Condition 4:
(32) Meme hinaku upadïha hinaku
one only half only
'(She) ate only one half (of the bowl)'

The description provided by the second participant, who favored a locative interpretation of the container phrase, is presented below. In these descriptions, particularly in condition 3, the participant used *yauda kaneku he* (measure unit: two cups) but emphasized that Paula only drank one bowl (*ixu meme hinaku*):

Condition 1:
(33) Meme
'One (bowl)'

Condition 2:
(34) Meme hinaku naniã yahã ixu
one only full NOM eat
'(She) drank only one full (bowl)'

Condition 3:
(35) Yauda kaneku he itu duha ixu meme hinaku
two cup in drop then eat one only
'(Someone) dropped two cups then (she) ate one'

Condition 4:
(36) Kaneku he upadjiha hinaku itutu duha ixu meme hinaku
cup in half only drop.RED then ate one only
'(Someone) dropped half cups and then (she) ate one (bowl)'

Pour

Out of the eleven adults that answered this list, two answered the control question incorrectly. Consequently, their answers were discarded in the analysis. All the other nine adults accepted the descriptions provided; four of those provided alternative descriptions. However, their descriptions did not emphasize the amount of beans in the cups as illustrated below:

Condition 1:
(37) Txabïu itu he
three drop in
'(She) dropped three (portions of beans) in (the bowl)'

Condition 3:
(38) Txabïu maxĩ pe itutu he
three now ? drop.RED in
'Now (she) dropped three (portions of beans) in (the bowl')

Overall, the results for the verb *itu* 'pour' suggest that the participants were not affected by the manipulations of container size and quantities of beans. The initial intention was to test the verbs *awi* 'drink' and *itu* 'pour' as examples of measure verbs. However, the results suggest that the verb *itu* 'pour' and *awi* 'drink' are not analyzed by the same parameters: while *awi* 'drink' seems to be analyzed by the Yudja speakers in accordance with Partee & Borschev (2012) and might favor a measure interpretation, *itu* 'pour' is not; as such, *itu* 'pour' might not favor a measure interpretation.

Bring

Eight participants answered the questions that included the verb *dju wï* 'bring' (rice/water).[11] Out of these eight participants, only one provided alternative descriptions for conditions 2 to 4 and described the variation in the size of the container and in the quantities of substances across conditions. An example of the alternative description provided is presented below:

Condition 2:
(39) Yauda idjuwï nana he urapahĩ tadei nana he xĩ
two bring DEM in big CONJ DEM in small
'(Someone) brought two: this is big, this is small'

Condition 3:
(40) Nana nanĩu nana upadjihu
DEM full DEM half full
'This full, this half full'

Condition 4:

(41) Upadjipadjiha hinaku
half.RED only
'Only halves'

As expected, individuation contexts are more likely to be compatible with all conditions independently of the size of the containers involved, substance type (liquids or granulated) or the exact quantity of substances.

5.2.2. General Discussion: adults

The results of this felicity judgment task with the verbs *dju wï* 'bring', *itu* 'pour' and *awi* 'drink' has shown that for the verbs *dju wï* 'bring' and *itu* 'pour' adult Yudja speakers did not give different answers in the different conditions. While we originally used *itu* 'pour' as a potential case of a verb that favors measure, the results show that *itu* 'pour' does not elicit different results in comparison with a non-measure verb such as *dju wï* 'bring'. It could also be the case that the context we manipulated was not the best one to create a bias in favor of a measure interpretation: Yudja speakers mentioned in several interviews that measuring is irrelevant for cooking.

Different results were obtained with the verb *awi* 'drink'. Some participants were reluctant to accept the description provided in contexts where the amounts of water did not exactly correspond to two cups (conditions 2 to 4). Other participants preferred a locative interpretation of the container phrase and provided alternative descriptions where the container phrase corresponded to the container used to drink water (bowl), instead of the container used to measure the quantities of water (cup). As such, the measure context/verb bias impacted speakers' evaluation of the sentences with container phrases. We conclude from this data that Yudja's container phrases can be used to describe measure contexts, not only concrete portions. Below we present the results of the same tasks with children. Our critical question is: if the locative interpretation is the default interpretation of container phrases in Yudja, will the measure interpretation emerge later for children even in contexts that favor such interpretation?

5.3. Preliminary children's data

The same materials and methods were used in tasks with 26 Yudja children (7, 5-to-6-year-olds, 6, 7-to-8-year-olds, 6, 9-year- olds, and 7, 10-to-13-year-olds). Nine children answered the task with the verb *awi* 'drink'; five children answered the task with the verb *itu* 'pour' and twelve children answered the task including the verb *dju wï* 'bring' (water/rice). The results are presented below.

Drink
Out of the nine children that answered the task that included the verb *awi* 'drink', four answered the control question incorrectly. Considering the results of the other five children, two of them accepted the description provided in all conditions (therefore not analyzing the sentence based on measure parameters) and three of them emphasized that the woman drank one bowl while pointing at the bowl that was used to drink water; as such, we could hypothesize that these children favored a locative interpretation of container phrases. We observed a similar pattern when analyzing adults' data: a few adults favored a locative interpretation of container phrases even in strongly biased measure scenarios.

Bring
In tasks that included the verb *dju wï* 'bring' (intended to bias an individuation reading), all children that answered the control question correctly (eight out of twelve children) accepted the descriptions provided by the experimenter in all conditions.

Pour
Out of the five children that answered the task that included the verb *itu* 'pour', four answered the control question incorrectly. The single child that answered the control question correctly accepted the descriptions provided by the experimenter in all conditions (as adults).

5.3.1. General discussion: children

The results for Yudja children suggest a path in the acquisition of the interpretation of container phrases: by hypothesis, in early stages of

acquisition, when children interpret container phrases they first count the number of containers or they interpret containers as locatives, ignoring the amounts of substance inside the containers, even in measure scenarios. This hypothesis is based on Partee and Borschev's theory: a measure interpretation of container phrases is a more complex and abstract interpretation of container nouns in comparison with the individuation/locative interpretation. These results also support the previous findings that show that children under 6 years of age have a low performance in tasks that involve the interpretation of measure words (liters, teaspoons, tablespoons - Gal'perin & Georgiev 1969; Levin & Wilkening 1989). In the next section, we will see that the same holds for English speaking children.

6. CROSS-LINGUISTIC STUDIES ON INDIVIDUATION AND MEASURE

In this final section we compare the results of the studies in Section 5 with the results of the same studies in two other languages (English and Kawaiwete) where containers are not optional in constructions with numeral and mass nouns.

6.1. English (Lima et al. 2015)

Container phrases (or standard measure phrases such as *kilo, liter*) in English are required in constructions with numerals and mass nouns. In counting scenarios, these phrases indicate the counting unit, but they can also be used in measure contexts. Lima and Snedeker (2015) investigated whether the parameters described by Partee & Borschev (2012) affected how English speaking children and adults interpreted these phrases and also whether a measure interpretation of container phrases emerges later (in comparison with individuation).

Thirty-three English speaking children (3 to 6 year olds) and 37 English speaking adults answered the same tasks described in Section 5 for Yudja: the participants saw a sequence of five short videos that bias the interpretation of a container phrase towards a measure interpretation (Maria drank two cups of water/poured three cups of beans) or an individuation interpretation (Mary put two bottles of milk/bowls of rice on the table). The four videos differed on whether the containers were full and identical or not. The expected answers were the same as the ones described in Table 3, Section 5.

Lima and Snedeker found that younger children (3 to 5 year olds) treated measure and individuation scenarios alike: they answered "yes" when they saw containers that have different amounts of a substance or of different sizes in both the individuation and in the measure scenarios. Like adults, 6 year olds distinguished measure from individuation: they only answered "yes" in measure scenarios if the containers were completely full (a-b). 6 year olds answered "yes" for all individuation scenarios, as expected, independently of whether the containers were identical/full or not.

The results in English provide a piece of evidence in favor of a hypothesis according to which individuation precedes measurement during language development. While young English children did not distinguish individuation from measurement, older children (6 year olds) are able to tease those two interpretations apart just like adults. As such, these results corroborate the hypothesis that the measure interpretation of container phrases is a more complex and abstract interpretation of container nouns in comparison with the individuation interpretation, as suggested by Partee & Borschev (2012). The results found with Yudja children could also suggest that the locative and individuation interpretations of container phrases are less restricted and seem to be acquired first.

6.2. Kawaiwete

Kawaiwete (also known as Kayabi) is a Tupi language (Tupi-Guarani family) spoken in Brazil. Kawaiwete is a very different language from Yudja in the sense that container phrases are obligatory in construction with numerals and substance-mass nouns. Lima and Kayabi (in press) have shown that container phrases indicate the counting unit (42a); without the container phrases the only possible interpretation is that we are counting the number of events someone drank a undefined quantity of water (42b):

(42) a. Maria muapyr-y'a-a 'y-a werut
Maria three-bowl-A water-A bring
'Maria brought three bowls of water'
'Maria brought bowls of water three times'

b. Maria muapy 'y-a werut
Maria three water-A bring
'Maria brought bowls of water three times'
'Maria brought three bowls of water'

Kawaiwete is a language where two types of container phrases are available: a locative container phrase (similar to Yudja) and a construction that does not include a postposition (43b and 44b):

(43) a. Maria mukũi kanekũ 'ya atykut
Maria two cup water drink

(44) a. Maria mukũi yrerusinga 'ya werut
Maria two bottle water bring

(43) b. Maria mukũi kanekũ pype 'ya atykut
Maria two cup posp water drink

(44) b. Maria mukũi yrerusinga pype 'ya werut
Maria two bottle in water bring

A Kawaiwete consultant answered two out of the four lists described in Section 5: the *drink* and *bring* lists. The results for *atykut* 'drink' and *werut* 'bring' were different. For the verb *werut* 'bring', both descriptions (44a and 44b) were accepted in all conditions. For the verb *atykut* 'drink' a different pattern was observed: the consultant accepted the description (45a) only for condition 1 and provided alternative descriptions for all other conditions, as presented below:

Condition 2
(45) a. Paula majepei tee kanekũ sikõ'ĩ ma'epy pe tuwiu ma'e
Paula one ? cup small one in big thing
pype imanau y'a pype a'ere Maria ẽ'ẽ itykua.
inside pour bowl inside then Maria 3S drink
'Paula poured one small (cup) and one big (cup) with water inside a bowl then Maria drank it'

Condition 3
(45) b. Maria ẽ'ẽ majepei kanekua majepeja e'kwarimũ ete
Maria 3S one cup one half ?
'y rykua y'a pype.
water drink bowl inside.
'Maria drank one cup and ½ of water that was inside a bowl'

Condition 4
(45) c. Mukuĩkanekua e'kwarimũ tee Maria ẽ'ẽ atykut 'ya
two cup half ? Maria 3sg drink water
y'a pype
bowl inside
'Maria drank two half full cups of water that were inside a bowl'

Note that (43b) was not accepted in any of the conditions. The consultant observed that "the cup was not the container used by the speaker in order to drink water". These results from Kawaiwete suggest that the locative container phrase construction is unlikely to be associated with a measure interpretation in this language; its primary interpretation is a locative interpretation. In Section 5, we saw that some of the Yudja adults and children interviewed were also more prone to only associate a locative interpretation or an individuation interpretation to container phrases even when the measure interpretation was favored.

7. FINAL REMARKS

The goal of this paper was to discuss the interpretation of container phrases in Yudja. Yudja container phrases are a puzzle for the count/mass literature given their morphosyntatic properties and their optionality in constructions with numerals and notional mass nouns. As discussed in this paper and in previous work (Lima 2014a,b) Yudja's container phrases are morphosyntatically identical to locative phrases.

Based on a felicity judgment task, we investigated whether verb semantics and context could affect the interpretation of container phrases

in Yudja. The results for the tasks in Yudja with children and adults suggest that context and verb semantics can affect the interpretation of container phrases. We saw that the same holds for languages where container phrases have very different grammatical properties, such as English and Kawaiwete.

Comparing the results across languages it was observed that questions that include the verb *bring* - which is a verb that hypothetically does not bias a measure interpretation - were likely to be accepted in all conditions, by children and adults in all languages.

When we analyzed the results of tasks that included the measure verb *drink* across languages we found more variation. In English and in Kawaiwete non-postpositional container phrases, adult speakers tended to not associate "Maria drank two cups of water" to conditions were the containers were not full or identical, as predicted by Partee & Borschev (2012).

In Yudja we found some variation: half of the participants accepted the description provided in conditions where containers were neither full nor identical. This could be due to an interference of the other possible interpretations of container phrases in this language, in particular the locative interpretation, which seems to be the most basic interpretation of those phrases given that they have the same syntax as do locatives.

In sum, these facts suggest that in a language where container phrases are required in order to indicate the counting unit (such as English or Kawaiwete), a construction such as "Maria drank two portions of water in cups" is going to be considered as false if the container used for drinking is not a cup. In Yudja, where container phrases are not required in order to indicate the counting unit and where container phrases can have a measure interpretation, Yudja speakers are more likely to interpret the container phrase as indicating a measure unit and not the location necessarily, if the context favors such an interpretation.

To conclude, this paper shows that there is no hidden container phrase when numerals are combined with notional mass nouns. In addition, supporting Partee & Borschev (2012), the results of the studies show that the individuation reading is more "primitive", i.e. it precedes measuring in language acquisition.

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Notes

[1] Coercion is a technical term for shifts from count to mass nouns and mass nouns to count nouns. In the sentence 'Two beers and a coffee, please' the interpretation of 'coffee' yields portions. In this example, the shift is the so-called 'universal packer/packager' (Gleason 1965; Pelletier 1975). This function takes a substance and returns portions associated with it. This kind of shift in most languages is restricted to conventionalized portions. Cf. Gleason 1965; Pelletier 1975; Doetjes 1997; Frisson & Frazier 2005; Wiese & Maling 2005; Lima 2012, 2014b for more details.

[2] As described by Fargetti (2001), other locative postpositions in Yudja that have the same syntactic distribution as *he* 'in' are *txade* 'above', *uabïada* 'below', *kuzaibi* 'behind', *nade* 'in front', *kãli* 'outside', *dibi* 'from'. The focus of this paper will be on the postposition *he* 'in' as this is the only postposition that occurs consistently in constructions with numerals and mass nouns when a container noun is included in these sentences.

[3] In this paper we are using capital letters as to refer to kinds.

[4] Varzi (2007) defines self-connectedness as the following:

(i) Self-connectedness:
$SC(x) =_{def} \forall y \forall z [\forall v [O(v)(x) \leftrightarrow (O(v)(y) \vee O(v)(z))] \rightarrow C(y)(z)]$

According to this definition, saying that an entity is self-connected means that whenever we partition this entity in two parts, these two parts are connected to each other.

Also according to Varzi (2007), a maximal self-connected portion of a kind k in a world w can be defined as follows:

(ii) Maximal self-connected portion of a kind in a world of evaluation:
$MSC(x)(k)(w) =_{def} SC(x) \& x \leq k(w) \& \neg\exists y [x < y \& SC(y) \& y \leq k(w)]$

According to the definition, saying that an entity is a maximal self-connected portion of a kind k in a world w means that this entity is a self-connected portion of k in w that is not a proper part of any self-connected portion of k in w.

[5] In this paper I won't explore the interpretation of notional count nouns such as *chair*. However, in studies with notional count nouns it was observed that parts of artifacts might be described with bare nouns. We argue that the motivation for that might be the

optionality of pseudopartive words in constructions with numerals and notional count nouns (Lima et al. 2015). These facts suggest that while natural atoms are more likely to be counted, natural atomicity is not a requirement for counting (cf. Rothstein 2012).

[6] Khrizman et al. (2015) argue in favor of distinguishing three type of individuation reading. These readings are: shape classifiers (the reading in which containers containing stuff are counted as in 10a – note that this is the reading correspondent to the individuation reading in Rothstein 2012); contents classifiers (the reading where what are counted are the portions contained in the containers as in *I drank fifteen glasses of beer, five flutes, five pints, and five steins*) and free portions (the reading where the portions are not individuated by containers). In Lima (2014b) it was stated that noun phrases in Yudja such as *three water* naturally have a free portion reading.

[7] Khirzman, Landman, Lima, Rothstein and Schvarcz (2015) have argued that such portion readings are count readings and not a subcase of measure readings; this claim also underlines the definition of concrete portions presented for Yudja in Section 2.

[8] One of the properties of *ad hoc* measures (as described by Partee & Borschev 2012, and based on a personal conversation with Susan Rothstein) is that the containers should be full and identical. In this study we manipulated full and identical containers in order to favor a measure interpretation, but we are aware that identical and full containers could also be compatible with an individuation interpretation. As such, a new study where only a measure interpretation was available was done and it is described in Section 5.

[9] Children's age range: 7, 5-to-6-year-olds, 6, 7-to-8-year-olds, 6, 9-year- olds, and 7, 10-to-13-year-olds.

[10] The training task corresponded to four questions that were unrelated to the critical items. Participants were asked to locate animals, fruits and artifacts ('Where is the dog?', 'Where is the chair?', 'Where is the banana?', 'Where is the bottle?'). At the training phase, the participants received feedback if they provided the wrong answer. The training phase was intended to make sure that the participants got the task right and to ensure that a potential misunderstanding of the task did not cause any mistakes in the critical items. In the pre-test task, participants were tested on their knowledge of the name of the containers that were manipulated in the videos (bottles, bags, bowls). Participants answered four questions ('Where is the bottle of water?', 'Where is the bag of rice?', 'Where is the bowl of flour?', 'Where is the bottle of milk?').

[11] The eight adults that answered the *bring* lists also answered one of the measure lists (*drink* or *pour*). For that reason the overall number of answers (nine answers for the list that included *drink*; eleven answers for the list that included *pour*; eight answers for the list that included bring [water/rice]) is higher than the actual number of participants.

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